BAGLESS PORTABLE BACKPACK VACUUM CLEANER WITH BOTTOM-MOUNTED INLET HOSE

FIELD OF THE INVENTION

[0001] The present invention relates to vacuum cleaners, more particularly to portable vacuum cleaners, which are carried on the operator's back, allowing free movement of the operator's hands for greater accessibility of areas to be cleaned.

BACKGROUND ART

[0010] The earliest vacuum cleaners were floor-based models, with dust receptacle canister being dragged by the operator, typically facilitated by the wheels mounted to the bottom of the vacuum cleaner. The major disadvantage of such models was the inconvenience of reaching elevated or cumbersome areas to be cleaned (such as tight corners, stairways, shelves).

[0012] In response to this drawback, portable vacuum cleaners were designed to be carried by the operator, either as "back pack" vacuums, shoulder-mounted vacuums, and belt-mounted vacuums. These models were found to be useful in cleaning heavily congested areas in various commercial settings, such as office areas, hotels, theaters, and restaurants.

[0014] The conventional backpack vacuum cleaners available on the market today have the inlet vacuum hose attached to the top of the machine. The air moves from the hose through the top of the unit to the bottom vent port. This design requires special motor protection system to keep objects from damaging the suction fans. This protection system is usually a heavy-duty material that also serves as the vacuum bag retainer. This system provides for effective motor protection, but compromises system performance, since the resistance through the unit increases as the pores

in the retainer bag are impregnated with dust particles, and the vacuum bag starts to fill. This increased resistance will cause a decrease in overall machine performance.

[0016] The details of the conventional back-pack vacuum cleaner design are set forth in U.S. Patents 5,588,177; 6,073,301; 6,151,749; 6,295,692; 6,393,656; 6,568,026, the disclosure of which is incorporated by reference.

[0018] The present invention overcomes the shortcomings of the prior art by providing a portable vacuum unit with superior performance and ease of maintenance. Conventional backpack vacuum cleaners have inlet hoses attached to the top of the housing, with the air moving from the top to the bottom vent port. This design requires special heavy-duty motor protection system to keep objects from damaging the suction fans. This increased weight and resistance compromises system performance. To compensate for the added weight, most conventional backpack units use an injected molded plastic housing. Such housing, however, is less resistant to damage, as compared to the present invention.

SUMMARY OF THE INVENTION

[0030] It is an object of the present invention to provide a portable back pack vacuum cleaner, cylindrical in shape, of the type in which the vacuum is carried on the back of the operator, by the means of shoulder and belt straps. The vacuum hose, which collects dirt is connected to the vacuum unit 6 inches from the bottom of the unit. The hose is attached to the unit tangentially. The cleaner operates without a paper bag.

[0032] Other objects of the present invention will in part be obvious and will in part become apparent to those skilled in the art from the following detailed description in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050] FIG. 1 shows the basic overview of the components;

[0052] FIG. 2 shows the dimensional locations of all components;

[0054] FIG. 3 shows the harness location relative to the inlet hose connection and the hole size and locations for harness attachment;

[0056] FIG. 4 shows electrical connections and components;

[0058] FIG. 5 shows the detail of the unit's top cover, including vent holes, handle, and spacer;

[0060] FIG. 6 shows the bottom debris receptacle and attachment hardware to the main body;

[0062] FIG. 7 shows the inlet hose fitting and epoxy required to fill radial space between vacuum body and hose fitting;

[0064] FIG. 8 shows the motor mounting and sealing detail;

[0066] FIG. 9 shows the hose and wand assembly detail;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0100] The following discussion describes in detail one embodiment of the invention. This discussion may be construed, however, as limiting the invention to that particular embodiment. Practitioners skilled in the art will recognize numerous other embodiments as well.

[0102] This backpack vacuum is a portable unit that is attached to the operator by the attachment harness. This attachment method permits the operator a greater ability to negotiate furniture and other obstacles while using the machine. This invention is significantly different from the existing backpacks. The distinction between this backpack and existing machines is that the inlet is located 6" from the bottom of the base rather than the conventional top entrance machine and it is a bagless design. The advantages of this design are described in the operational portion of this application

[0104] FIG. 1 and FIG. 2 contain the basic overview and the dimensional size and location of all components. The main vacuum body **9** is made from 6"dia. PVC pipe. The 8' pipe is cut into four 22" sections. Each section is sanded to remove cutting burs. After sanding, each section is cleaned with Isopropyl Alcohol to remove all blemishes and manufacturer's identification marks. All component penetrations and attachment holes are drilled as indicated in Figures 1 through 4.

[0106] FIG. 3 indicates the location and dimensions of the holes needed to attach the back harness **8** to the main vacuum body **9**. The harness will be mounted to the vacuum after the motor **5** has been installed per FIG. 8.

[0108] FIG. 4 indicates the electrical connection detail. The cord assembly **1,2** is connected to the motor **5** wires using the schematic shown in this detail. The cord retainer **3** fastens the cord assembly to the housing **9**. The location and dimensions of the hole needed for the cord retainer were shown in FIG. 2.

[0110] FIG. 5 indicates the top cover of the unit, which is made from 6" diameter PVC pipe cap **10**. The top cover has six 1" symmetrically located holes to permit the discharged air to exit the unit with minimum motor backpressure. The cover has a stop ring **41** to permit adequate ventilation space between the motor and cover. The stop rings are sections of 6" PVC pipe cut to fit required width.

[0112] FIG. 5 also shows the vacuum transport handle **33**, which is attached to the top cover with two 10-24 x 1 ½" Phillips head screws and two lock washers and lock nuts to fit attachment screws. A cap filter **13** is glued to under side of cap. This filter is required to keep debris out of the motor compartment. The cap is attached to the vacuum housing with three 10-24 x ¾" self tapping screws.

[0114] FIG. 6 indicates the bottom dirt receptacle of the unit, which is also made from 6" diameter PVC pipe cap **10.** The bottom receptacle uses a 1 ½" spacer **41** to limit insertion and provide a seal between the vacuum housing and bottom cap. Two ¼" x 1 ½" eyebolts **19** are inserted into the bottom cap as shown in FIG. 6. Two bungee cords **22** are attached to the vacuum housing. The free ends of the bungee cords have spring clips **23**. The bottom cap is attached to the vacuum housing by connecting the spring clips **23** and the eyebolts **19**.

[0116] The hose fitting **11** is positioned over the inlet hole penetration and is oriented so that it is parallel to the bottom of the vacuum housing, as shown in FIG. 7. The fitting is attached to the housing with four ½" long 16-20 screws and lock nuts **39**. After both parts are secured, an epoxy **18** is applied to fill all void areas between the hose fitting **11** and the vacuum housing **9**. This epoxy provides an airtight seal and forms a structural bond between both parts. The unit is then lightly sanded and is sprayed with one primer coat and two finish coats of Rustoleum enamel.

[0118] FIG 8 indicates the detail of the attachment of the motor **5** to the vacuum housing **9**. The motor housing is pre-drilled for the 10-16 x ½" screws. Three Stanley 1" x 1" x ¼" pre drilled angles are attached to the Lamb motor **5** (model no. 116146.000), using a 10-16 x ½" self-tapping screws. A foam rubber seal **40** measuring ¼" x 1 ½" is used to provide the seal between the vacuum housing and the motor. The motor filter dome is placed over the motor and the assembly is placed in the housing using a 10-24 x ¾" Phillips head screw with lock washer and nut **39** as shown in FIG. 8. The location and dimensions of the holes needed for the motor mounts were shown in FIG. 2.

[0120] FIG. 9 shows the assembly of hose and wand components. The hose **12** and the wand **7** are assembled and test fitted into the vacuum inlet hose fitting **11**. The connection between these two assemblies forms a seal between the vacuum housing and the hose assembly. This test fit-up is required to ensure that the seal between these parts were not compromised during the painting operation. A light sanding of mating parts may be required to obtain desired seal.

[0122] After the motor is attached to the housing, the filter assembly **13** is fastened to the housing using a 10-24 x ¾" Phillips head screw with lock washer and nut. The location and dimensions of the holes needed for the filter assembly were shown in FIG. 2